Practice 7.1

1. a. What velocity must a car go around a 250. m radius corner to have a centripetal acceleration of 3.30 m/s/s? (28.7 m/s)   b. A centrifuge generates a centripetal acceleration of 3450 m/s/s with a period of 0.0258 s. What is the radius of the centrifuge? (0.0582 m)   c. What centripetal force do you need to make a 85.0 kg skier go 25.0 m/s around a 15.0 m radius corner? (3542 N)   d. A centrifuge exerts a force of 182 N on a 0.130 kg test tube spinning with a period of 0.0312 s. What is the radius of the centrifuge? (0.0345 m)   e. A 1120 kg car with a coefficient of friction of 0.730 goes around a level corner at 25.0 m/s. What is the minimum radius the corner can have? (87.4 m)
2. a. What is the centripetal acceleration of a skater going 6.40 m/s around a corner with a radius of 2.00 m? (20.48 m/s/s)   b. A centrifuge generates an acceleration of 9520 m/s/s with a radius of 0.0780 m. What is its period of motion? (0.0180 s)   c. A centrifuge has a radius of 0.0350 m, and a period of 0.0256 s. What force does it exert on a 0.0670 kg test tube? (141 N)   d. A 81.0 kg ice skater goes around a corner at 16.0 m/s. If the ice skates can generate a maximum lateral force of 480. N, what is the minimum radius of corner they can go around? (43.2 m)   e. A 0.0180 kg eraser is on a level turntable 0.170 m from the center. If there is a coefficient of friction of 0.850 between the turntable and the eraser, what is the minimum period of motion the turntable can have for the eraser to remain without flying off? (0.898 s)
3. a. A car goes 23.0 m/s around a corner with a lateral acceleration of 4.50 m/s/s. What is the radius of the corner? (118 m)   b. A centrifuge has a radius of 0.0920 m, and a period of 0.0450 s. What is its centripetal acceleration? (1794 m/s/s)   c. What force do you need to twirl a 4.30 kg hammer in a 1.28 m radius circle at 7.20 m/s? (174 N)   d. A centrifuge exerts 298 N on a 0.0370 kg test tube spinning in a 0.0650 m radius circle. What is its period of motion? (0.0178 s)   e. There is a coefficient of friction of 0.870 between a 1670 kg car and the level road. What is its maximum possible velocity around a 130. m radius corner? (33.3 m/s)
4. a. A car going around a corner with a radius of 180. m is accelerating laterally at 3.40 m/s/s. What is its speed? (24.7 m/s)   b. A centrifuge generates an acceleration of 6590 m/s/s spinning test tubes in a circle with a period of 0.0370 s. What is the radius of the centrifuge? (0.229 m)   c. A centrifuge makes 0.0790 kg test tubes go in a 0.0750 m radius circle with a period of 0.0545 s. What force does it exert on the test tubes? (78.8 N)   d. What is the maximum velocity you can twirl a 3.76 kg hammer in a 1.40 m radius circle if the string it is attached to has a tensile strength of 158 N? (i.e. that is the centripetal force) (7.67 m/s)   e. A 0.100 kg mass is on a level turntable 0.120 m from the center. If there is a coefficient of friction of 0.210 between the turntable and the mass, what is the minimum period of motion the turntable can have for the mass to remain without flying off? (1.52 s)
5. a. What is the centripetal acceleration of a skier going 13.0 m/s around a corner with a radius of 26.0 m? (6.5 m/s/s)   b. A centrifuge generates an acceleration of 2560 m/s/s with a radius of 0.0870 m. What is its period of motion? (0.0366 s)   c. What force do you need to twirl a 7.40 kg hammer in a 1.50 m radius circle at 12.0 m/s?? (710.4 N)   d. A 0.0650 m radius centrifuge exerts a force of 190. N on a test tube. What is the mass of the test tube if its period of motion is 0.0380 s? (0.107 kg)   e. There is a coefficient of friction of 0.740 between a 1780 kg car and the level road. What is its maximum possible velocity around a 180. m radius corner? (36.1 m/s)